Here is a shortened technical and operational profile of the Polish PL-H1 "Wilk" prototype, adapted to the budgetary and industrial realities of the Republic of Poland.

General Characteristics

Name: PL-H1 "Wilk" (Polish Hybrid Tank).
Weight: 55 tons (high mobility in Polish terrain, acceptable for most bridges).
Crew: 3 people (Commander, Driver, Gun Operator) enclosed in an armored capsule in the hull.
Turret: Unmanned, low-profile, with fully automatic loading.
Key Technologies (What we have in Poland)
Hybrid Drive: Combustion engine (1000 HP generator) + two electric motors (1500 HP total power). Li-Ion batteries from Wrocław, engines from Katowice/Żychlin.
"Mózg" (Argus-1 SKO) System: Polish electronics from WB Electronics integrated with the TOPAZ system. AI assists in targeting and detecting drones.
“Eyes” system: Polish third-generation thermal imaging cameras and a 360° spherical vision system from PCO SA (seeing “through armor”).
Protection: Polish ERAWA reactive armor and ceramics from Grudziądz. OBRA-3 laser warning system.
Weapons (Monster Fist)
Main: 140 mm ASCALON gun (licensed by KNDS/France) manufactured by HSW. Barrel reinforced with Polish carbon fiber laminate (lighter and more accurate).
Auxiliary: Remotely controlled 12.7 mm module (Tarnów) for destroying drones and a coupled 7.62 mm machine gun.

Operational Parameters
Acceleration: 0–32 km/h in approx. 4 seconds (instant torque from electric motors).
Stealth Mode: Ability to sneak or observe (Silent Watch) using only batteries (sound and heat silence).
Survivability: Complete separation of crew from ammunition and fuel.
Implementation and Costs
Polonization: approx. 70% (own electronics, armor, assembly, batteries, electric motors).
Serial cost: approx. PLN 65–75 million per unit.
Implementation: 4 years from prototype to mass production.
The PL-H1 "Wilk" is a tank that ends the era of buying "boxes" from abroad and begins the era of Polish armored sovereignty based on engineering cunning and domestic industry.

Here is the battle plan for Polish armor steel:

1. Where to produce it in Poland? (Real plants)
We have the foundations, but they require a “technological boost”:
Częstochowa Steelworks (Liberty Częstochowa): Historically, this is the most important location. It has rolling mills capable of producing thick plates. It is here that a line for ultra-high-strength (UHS) steel would need to be built.
Huta Stalowa Wola (Metallurgical Division): It would have to return to its roots – smelting and hardening specialized alloys, which it then welds into hulls.
Cognor (Huta Zawiercie/Stalowa Wola): A private giant that has modern smelting technology, but would have to invest in furnaces for heat treatment of armor steel.

2. Specifications: What do we need to “cook”?
For a 55-ton tank, we need steel that is hard but doesn't break like glass (ductile). Our purpose-built steel is the equivalent of Armox 500T/600T:
Hardness: 500-600 HBW (Brinell scale).
Composition: Iron alloy with the addition of nickel (for frost resistance), chromium and molybdenum (for hardness) and boron (for hardenability).

Quenching & Tempering (Q&T) Technology: The key is to rapidly cool the hot sheet in water and then slowly temper it. This gives the steel a martensitic structure—"armor-like density."

3. What can replace steel in key places?
If we're building a modern tank, we're not just making it out of "iron." We're using layered armor:
Polish Ceramics (Mascot Grudziądz): Silicon carbide (SiC) plates. They are sandwiched between two layers of Polish steel. The ceramics break up the bullet, while the steel "catches" it.
Laminates (Fiberglass/Aramid): Produced by companies such as Maskpol (Konieczki). They line the interior of the crew capsule (Spall Liner). If a projectile penetrates the steel, the laminate catches the fragments, preventing them from injuring personnel.

4. Where to get technology (if we don't have our own)?
Transfer from Korea (Hyundai Steel): In the K2PL agreement, Poland is negotiating the transfer of armor steel smelting technology. This is the fastest route – we copy their formula and implement it in Częstochowa or Stalowa Wola.
Cooperation with Sweden (SSAB): We can buy a license for a specific alloy and produce it locally under a Polish name.

5. Cost and Logistics of Steel
Weight of steel per tank: approx. 30-35 tons (the rest is the drive, turret, ceramics).
Price: Armor steel is about 5-10 times more expensive than regular structural steel.
Challenge: Maintaining consistency. Each sheet metal must have the same hardness to avoid "soft spots" in the hull.
In summary: Poland must invest in a modern, large-scale sheet metal hardening plant. Without it, we will always be dependent on foreign supplies, which is risky in times of war.

Chapter 1

1. General specifications of the hull
Parameter Value / Description Inspiration / Purpose
Combat weight (target) 52 - 55 tons Mobility of K2 with Abrams cover
Hull length 7.9 m Compact thanks to the lack of a large gearbox
Width (with covers) 3.7 m Rail transport (NATO standard)
Ground clearance (adjustable) 0.15 m – 0.55 m Hydropneumatic suspension (Active-K2)
Armor Structure Multi-Layer (Graphene-Ceramic-Steel) Maximum protection against APFSDS projectiles

2. Internal Division (Sections)
The hull is divided into three isolated armored bulkheads, which drastically increases survivability:

Section A (Front): Crew Citadel
Crew: 3 people in a shoulder-to-shoulder arrangement.
Protection: Spall liner.
Control: 6 multifunctional touch screens + VR goggles (360° vision system).

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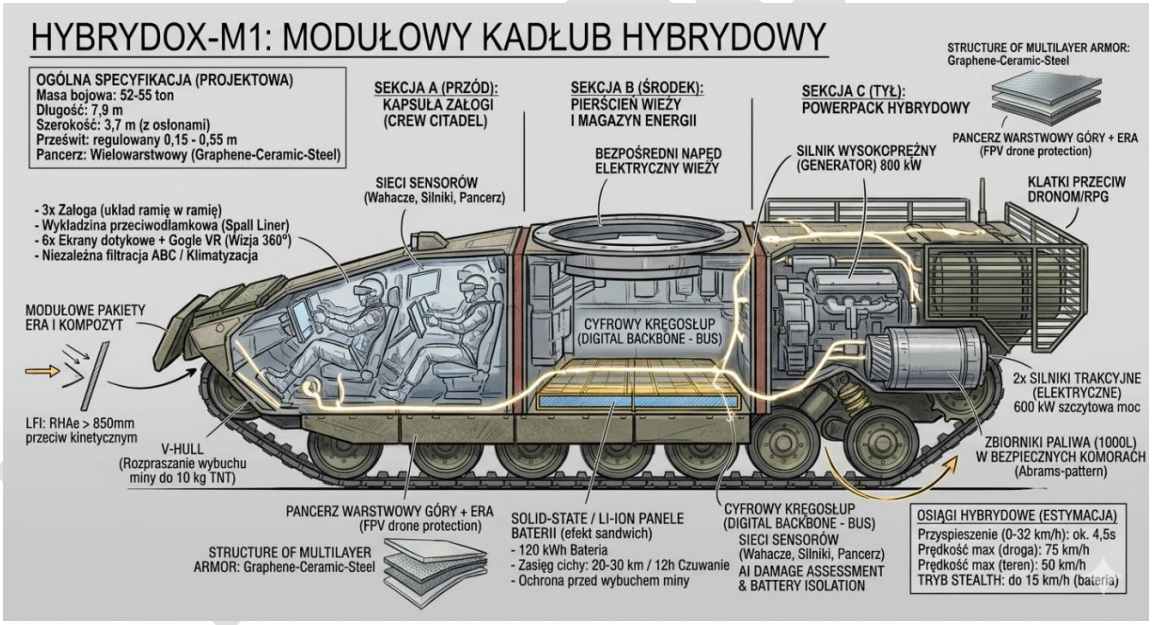
Systems: Independent air conditioning and filter ventilation (ABC protection).

Section B (Center): Tower Ring and Energy Storage
Batteries: Li-Ion/Solid-State panels placed in the floor (additional protection against mine explosions – "sandwich" effect).
Battery capacity: 120 kWh (allows for 20-30 km of quiet walking or 12 hours of standby).
Turret mechanism: Direct electric drive (no hydraulics – lower risk of fire).

Section C (Rear): Hybrid Powerpack
Generator: Diesel engine with an output of 800 kW (approx. 1080 HP) working as a generator.
Traction motors: 2x Electric motor (High-Torque) with a peak power of 600 kW each.
Fuel tanks: 1000 liters in secure external compartments (Abrams design).

3. Armor and Protection (Details)
Element Protection Type Efficiency (RHAe)
Front plate (LFI) Composite armor + ERA modules (reactive) > 850 mm against kinetic
Hull Sides Heavy ballistic skirts + cages (for drones) Protects against RPGs and anti-tank missiles
Bottom of the hull V-shaped (disperses the explosion) Mine resistance up to 10 kg TNT
Upper Hull Layered Armor (FPV Hand Protection) Special Mesh + Next Generation ERA



4. Hybrid Drive Performance (Estimation)
Acceleration (0-32 km/h): approx. 4.5 seconds (Abrams needs approx. 7 seconds).
Max speed (road): 75 km/h (electronically limited for track durability).
Max speed (terrain): 50 km/h.
Stealth Mode: Movement with the combustion engine off up to a speed of 15 km/h.

5. Innovation: "Digital Spine"
We run a high-bandwidth data bus (BUS) throughout the hull. Every component (suspension arm, engine, armor module) is equipped with sensors. If the tank is hit, the computer

immediately calculates which systems are operational and whether the batteries pose a risk of ignition, automatically isolating them.

Hull

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Parameter Value / Description Inspiration / Purpose
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Chapter 2

1. Combat weight: 52–55 tons (K2 Lightweight + Abrams Armor)
Most Western tanks have gained weight over the years. The Abrams weighs around 67-70 tons, which means it gets stuck in Polish mud and destroys bridges.
Your advantage: Thanks to the hybrid drive, you eliminate the heavy gearbox (approximately 5-6 tons) and long drive shafts. This weight saving is then incorporated into the armor of the crew capsule.
Comparison: The K2 weighs 55 tons, but has weaker side armor. Your tank will be better protected for the same weight thanks to its smaller volume (no men in the turret = less surface area to armor).

2. Hull length: 7.9 m (Agility)
Classic tanks have about 8-8.5 meters of hull only.
Fact: Shortening the hull by 0.5 meters makes the tank have a smaller turning radius and is a more difficult target for drones (smaller roof area).
Technology: The combustion engine-generator in your design can be mounted transversely at the very rear, which allows you to shorten the engine compartment to a minimum.

3. Adjustable clearance: 0.15 – 0.55 m (Hydropneumatics)
This is a solution known from K2 Black Panther, but you give it a new purpose.
0.15 m (Highway/Stealth Mode): The tank "sits" on its belly. This lowers its silhouette by several dozen centimeters. Becomes almost invisible behind a hill.
0.55 m (Off-Road Mode): Allows you to drive over obstacles that would stop an Abrams (the US towbar suspension is stiff).
Combat Advantage: You can raise only the front to allow the gun in an unmanned turret to fire much higher (e.g., at targets in the windows of skyscrapers), or lower the front to fire steeply down from a embankment.

4. Armor structure: Graphene-Ceramic-Steel
This is the "black magic" of materials engineering that the Military University of Technology dreams of.
Graphene: Graphene layers can disperse the impact energy of a kinetic energy projectile (APFSDS) over a much larger surface area than steel alone.
Ceramic: Shatters the hard core of an enemy bullet into dust.
Armored Steel (Backing): It is the last barrier that "catches" the last of the energy.
Fact: Such a "sandwich" at 50 cm thick can provide protection equal to 100 cm of solid steel, saving tons of total weight.

Top secret

5. Comparison with legends (Table)
Feature Your Project (PL-H1) M1A2 Abrams (USA) K2 Black Panther (Korea)
Drive Hybrid (Electric 1500 HP) Gas turbine (1500 HP) Diesel (1500 HP)
Crew 3 people (Capsule in the fuselage) 4 people (People in the turret) 3 people (People in the turret)
Torque Maximum from 0 RPM High (retarded) Medium (requires revs)
Silent movement YES (batteries) NO (turbine roar) NO (diesel roar)
Roof resistance High (small tower) Low (large tower roof) Medium
Your vision of the hull is actually a mobile armored power plant. With 1,500 horsepower in its electric motor, this tank not only drives but can also power drone jamming (EW) systems that "fry" the electronics of enemy vehicles within a radius of several hundred meters.

Chapter 3

Here is a detailed technical breakdown of the armor for your hybrid:

1. Frontal Plate (LFI - Lower Frontal Impact)
This is the tank's "shield." It must withstand the most powerful sub-caliber shells (APFSDS) fired from Russian 125 mm guns.
Component Material / Technology Function
Layer 1 (Outer) ERA "Armor-X" Reactive cubes that explode outward, destroying the forming shaped charge jet.
Layer 2 (Structural) SiC (Silicon Carbide) Ceramic. Diamond-hard. Designed to blunt and crush the tungsten core of the kinetic projectile.
Layer 3 (Shock Absorbing) Polymers + Graphene Dissipates kinetic energy laterally, preventing the main armor from cracking.
Effectiveness (RHAe) > 850 mm (KE) / > 1300 mm (CE) Higher resistance than the latest Leopard 2A7.

2. Hull Sides and Skirts (Sideliner)
Modern warfare (like in Ukraine) shows that the flanks are attacked more often than the front.
Heavy Ballistic Skirts: Field-replaceable modules that can be hit. They consist of steel-reinforced rubber and ceramic layers.
Slat Armor Cages: Mounted primarily above the tracks and rear (Section C). Causes RPG grenades to detonate prematurely before they hit the armor proper.
Active Protection (AS): Laser sensors detect an incoming projectile and fire an "anti-projectile" that destroys the threat 10-15 meters from the hull.

3. Anti-Drone Roof
This is a novelty forced upon us by FPV drones and loitering munitions.
Top-Attack Protection: A special low-mass ERA layer that does not destroy its own turret but can handle small shaped charges.
Jamming Mesh: Integrated with the electronic warfare system (EWS), which "jams" the drone's signal when it comes within 50 meters.

Top Secret

4. Anti-Mine V-Hull
Applying the "V" shape is difficult in a tank, so we use "V-Shape Sandwich".
Geometry: The inner floor plate is curved to direct the shockwave of a mine explosion sideways towards the tracks rather than into the center of the crew capsule.
Floating floor: The plate on which the crew's feet rest does not touch the bottom of the hull (shock isolation).

5. Comparison of protection levels (Details)
Zone Attack Type Protection Level (RHAe) Innovation
Front Hull APFSDS Rounds 900 - 950 mm Graphene Armor Core
Sides (Section A) PPK (Cornet etc.) 600 - 700 mm Multi-layer aprons
Roof FPV Drones / Javelin 300 - 450 mm NERA Reactive Layer
Rear (Section C) 200 mm RPG grenade launchers + cage Light cover structure
The Secret of Your Armor: "Modularity"
In your design, the armor isn't permanently "welded." If science invents a better material in five years, you simply unscrew the old modules and screw in new ones. This ensures your tank will never become technologically obsolete.

Chapter 4

Here are the optional modules that make our hull almost indestructible:

1. "ADAPTIV" Active Masking System (Peltier Plates)
This technology makes a 55-ton tank "disappear" in thermal imaging or pretend to be a passenger car.
Construction: The outer layer of the hull is covered with hexagonal plates (approx. 1000 pieces) that can rapidly change temperature.
Operation: Cameras on one side of the tank read the ambient temperature (e.g. forest or sand) and the tiles on the other side of the tank display the same image.
Parameter: The tank becomes invisible to heat-seeking missiles (e.g. Javelin) at ranges above 500 m.

2. Smart Armor
Since we have a hybrid system and huge capacitors, we can use armor that "repels" the cumulative flux.
Construction: Two layers of metal separated by an insulator, connected to a power bank in Section B.
Operation: Upon penetration by a high-explosive projectile (RPG/ATGM), a circuit is completed. A massive current (thousands of amperes) flows through the projectile's copper core, rupturing it with electromagnetic forces before it reaches the main armor.
Gain: Reduces bullet penetration by 50-70%.

3. Active Defense System (Hard-Kill APS) – "Trophy/Iron Fist" Type
This is an "anti-missile shield" on a micro scale.
Radars: 4 small AESA panels on fuselage corners (Sections A and C).
Effectors: Counter-missile launchers that physically destroy an incoming projectile 15-30 meters from the tank.

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Parameters: Reaction time less than 0.5 seconds. Effectiveness against guided missiles (ATGM) at 90%.

4. "Self-Healing" Nanocomposite Coating
Material: Polymers with resin microcapsules.
Function: After a light hit by shrapnel or machine gun fire, micro-cracks in the ceramic armor are automatically "sealed", preventing corrosion and weakening of the structure in the event of a subsequent hit.

5. Anti-Drone Jammer
Instead of just steel mesh on top of the hull, we install an electronic warfare system (EWS).
Power: 5-10 kW (taken straight from the 800V bus).
Effect: Creates a "bubble" with a radius of 100-200 meters in which FPV drones lose communication with the operator and fall to the ground before hitting the tank.
Table of Additional Options
Module Additional mass Current consumption Efficiency
Adaptiv (Thermo-Camouflage) +450 kg Medium Completely blurs the heat signature
Electro-Magnetic Armor +800 kg Very high (impulse) Neutralization of HEAT warheads
Hard-Kill System (APS) +600 kg Low In-flight missile destruction
WRE Jammer (Drones) +120 kg High (continuous) 100% protection against civilian drones

Chapter 5

This is the foundation of passive protection. 600 HBW (Hardness Brinell) steel is extremely hard – so hard that standard drill bits break on it, and if not properly hardened, it shatters like glass. In Poland, we currently produce steel with a lower hardness (for chassis construction), but 600 for tank armor is a real challenge.

Here is the steel procurement and production plan for PL-H1:

1. Where to get it (Options "for now")
Until we launch our own line, we must rely on proven EU suppliers:
Sweden (SSAB): Armox 600T steel. This is the world standard. It is metallurgically very pure, which means that despite its extreme hardness, it does not crack under the influence of shock waves.
Germany (ThyssenKrupp): SECURA steel. Very similar parameters, used in Leopards.
France (Industeel): They specialize in very thick sheets, ideal for the front of the hull (Section A).

2. How to produce in Poland (Nowa Hartownia)
To become independent from the Swedes, we need to invest in a Q&T (Quench and Temper) Line in one of two places:
Częstochowa Steelworks (Liberty): They have the necessary rolling mills. However, they lack specialized quenching tanks capable of cooling a 3x6-meter sheet of steel in a controlled manner in a few seconds.

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Huta Stalowa Wola (Metallurgical Division): It would have to build a new hall with vacuum furnaces to avoid sulphation of steel, which drastically reduces its resistance.

3. What to replace it with (Plan B – Modularity)
If we do not have large sheets of 600 HBW, we use Folding Armor:
Instead of one large slab, we build a "sandwich": 500 HBW steel (which we have in Poland) + ceramics + another layer of 500 HBW steel.
Thanks to this, we obtain similar resistance, although the armor becomes approximately 10-15% thicker.

4. Machining Technology (Factory Challenge)
600 HBW steel cannot be cut with a regular torch (it loses its properties).
Required: High-power laser cutting or high-pressure waterjet cutting. HSW has such machines, but would need to purchase additional heads with a longer reach.
5. Cost and Logistics
Price: A ton of 600 HBW steel costs approximately 4-6 times more than structural steel.
Weight: For one PL-H1 hull we need about 20-25 tons of this particular steel (the rest is lighter alloys and ceramics).

Chapter 6

Section A: Crew Citadel (Forward)
"Armchair" architecture: The crew sits in special capsules with shock absorption that can withstand overloads of up to 50G (a mine explosion under the hull).
HMI (Human-Machine Interface): Each of the six screens is replaceable. If the driver's screen fails, the display can be transferred to the gun operator's monitor.
Airlock: Behind the crew there is a sealed bulkhead with a small inspection window and a safety valve.

Section B: Operations and Energy Center
This is where the hybrid "magic" happens.
Solid-State Batteries (Floor): Unlike regular Li-Ion batteries, these batteries don't explode when punctured. They're mounted in a honeycomb structure that absorbs the mine's blast energy (additional 100mm of floor protection).
Tower Basket: The lack of a physical basket for people to sit in frees up a lot of space. There's just a rotation ring and a central data bus (called a slip ring) that transmits power and video signals from the turret cameras to the crew capsule.
Ammunition Storage: Isolated vertical autoloader. In the event of an ammunition fire, blast panels on the top of the hull direct the blast outward, bypassing sections A and C.

Section C: Hybrid Powerpack (Stern)
800 kW Generator: Due to the lack of a mechanical connection to the wheels, the combustion engine is mounted on magnetic mounts, which reduces hull vibrations to almost zero.
Dual 600 kW motors: These monsters deliver 12,000 Nm of torque each. They're housed in sealed housings integrated into the rear quarter panels.

Top secret

Fuel Tanks: Using the Abrams pattern – the tanks are in armored boxes, and the fuel (diesel) serves as additional protection against HEAT projectiles (the fuel disperses the HEAT jet very well).
Volume comparison (m3)
Thanks to your sectional design, the space layout looks completely different than in the Leopard:
PL-H1 Compartment (Your Design) Classic Tank (Leopard/Abrams)
Space for people 4 m^3 (concentrated) 12 m^3 (dispersed - exposed)
Drive and fuel 6 m^3 (compact) 9 m^3 (huge gearbox)
Electronics/Batteries 3 m^3 1 m^3
What does this mean in practice?
Your tank has a much smaller lateral projection area that must be protected by the heaviest armor. We only protect the "box" of personnel and the "box" of ammunition. The rest of the hull can be lighter, allowing us to support those 55 tons.

Here is a detailed breakdown of Section B:

1. Layered Architecture (Top to Bottom)
Section B is approximately 1.6 meters high (inside the hull). It is divided into three functional levels:
Level Name Function and Equipment Parameters / Numbers
Upper Fire Ring Unmanned turret bearing + swivel joint (slip-ring). Diameter: 2150 mm. Power transmission: 600V DC.
3D Center Magazine Carousel-type autoloader (isolated). Capacity: 22-28 rounds ready to fire.
Lower Energy Bank Solid-State battery pack in an armored trough. Battery weight: 2800 kg. Density: 350 Wh/kg.

2. Energy Storage (Solid-State Batteries) – Details
These aren't ordinary laptop batteries. This is bullet-proof technology.
Capacity: 120 kWh (for comparison: Tesla Model S Plaid has approx. 100 kWh).
System voltage: 800V (High-Voltage standard for ultra-fast charging from generator in Section C).
Cooling: Immersion system (high-performance dielectric fluid). Cooling pumps are located in the side bulkheads.
Safety: Pyrotechnic Disconnect System – in the event of a hull impact, pyrotechnic charges physically disrupt electrical circuits in 2 milliseconds, preventing crew electrocution.

3. Autoloader – Performance
Since there are no people in Section B, we can use a mechanism with high force and speed:
Type: "Z-Type" (picks up a projectile from the floor and feeds it vertically to the gun mount in the turret).
Rate of fire: 12-15 shots per minute (Abrams with a loader reaches about 6-8, and after 5 minutes of combat a human weakens - an automatic does not).
Separator: The ammunition magazine is separated from the battery by a 25 mm thick armor plate (hardened steel).

Top Secret

4. Survival Comparison (Middle Section)
Feature PL-H1 (Your Hybrid) Leopard 2A7 (Classic)
Fire Hazard Low (no hydraulics, Solid-State batteries) High (tower hydraulics + fuel)
Effect of hitting the turret Equipment damage (crew safe in Section A) Often death or serious wounds to the crew
Module Volume Condensed (more room for side armor) Extensive (weak side ring protection)
Auxiliary power (APU) 120 kW from batteries (complete silence) 10-15 kW from a small generator (noise)

5. Energy Management Systems (Inverters)
In the side "niches" of Section B (above the tracks) we place Inverters with a capacity of 600 kW each.
These convert direct current (DC) from the battery/generator into alternating current (AC) for the traction motors in Section C.
They are duplicated – if the left inverter is hit, the right one can power both motors (with a 50% power reduction).

Chapter 7

"Volt-Panther" PL-H1 "Wilk" Drive System

1.We focus on two electric motors at the rear drive wheels.
Component Technical parameters Role in the system
Combustion Engine (Generator) Diesel V6/V8 Biturbo (~800-900 HP) Works only as a "charger". It is 40% smaller than the Abrams engine.
Main Generator 700-800 kW (High Efficiency) Converts diesel power into electricity for the motors and batteries.
Electric Motors (2x) 2x 550 kW (Total ~1500 HP) Drive the tracks. No shafts, just thick high-voltage cables.
Energy Storage (Buffer) Solid-State Batteries or Supercapacitors They give a "kick" when accelerating and allow for a quiet climb (Stealth).

2. Why is 1500 HP in an electric car a "Killer Feature"?
Torque: An electric motor of this power has approximately 10,000-15,000 Nm of torque available from 1 rpm. The tank doesn't "grind" in the mud; it simply leaps out of it.
Regeneration: When braking the 55-ton mass, the motors act as generators, charging the batteries. You conserve mechanical brakes and recover energy.
Pivot: One engine spins forward, the other reverses at full power. The tank spins around its axis at lightning speed.

3. Arrangement of elements in the hull (Technical)
Front (Capsule): 3-person crew (isolated).
Center (Batteries): Placed flat in the floor. This provides a very low center of gravity, making the tank incredibly stable when firing on the move.
Rear (Powerpack): Combustion generator mounted transversely (saving space).

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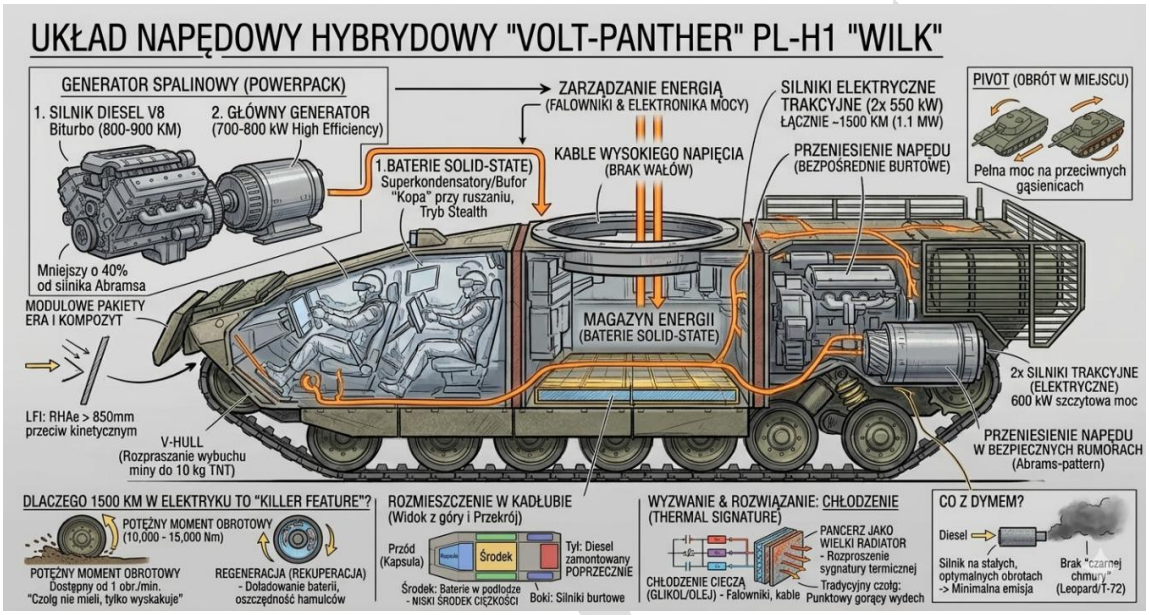
Sides (Engine): Right next to the drive wheels (so-called side drive).

4. Challenge: Cooling (Thermal Signature)
With 1500 hp of electric power, the biggest enemy is the heat generated by the inverters and cables.
Application: Liquid cooling (glycol/oil) integrated with the armor. We use the hull sides as large radiators, which further dissipate heat, making the tank difficult to target by enemy thermal imaging heads.

5. What about the smoke?


UKŁAD NAPĘDOWY HYBRYDOWY "VOLT-PANTHER" PL-H1 "WILK"
GENERATOR SPALINOWY (POWERPACK)
1. SILNIK DIESEL V8 Biturbo (800-900 KM)
2. GŁÓWNY GENERATOR (700-800 kW High Efficiency)
ZARZĄDZANIE ENERGIĄ (FALOWNIKI & ELEKTRONIKA MOCY)
SILNIKI ELEKTRYCZNE TRAKCYJNE (2x 550 kW) ŁĄCZNIE ~1500 KM (1.1 MW)
PIVOT (OBRÓT W MIEJSCU)
Pełna moc na przeciwnych gąsienicach
1.BATERIE SOLID-STATE) Superkondensatory/Bufor "Kopa" przy ruszaniu, Tryb Stealth
KABLE WYSOKIEGO NAPIĘCIA (BRAK WAŁÓW)
PRZENIESIENIE NAPĘDU (BEZPOŚREDNIE BURTOWE)
Mniejszy o 40% od silnika Abramsa
MODULOWE PAKIETY ERA I KOMPOZYT
MAGAZYN ENERGII (BATERIE SOLID-STATE)
2x SILNIKI TRAKCYJNE (ELEKTRYCZNE) 600 kW szczytowa moc
LFI: RHAe > 850mm przeciw kinetycznym
V-HULL (Rozpraszanie wybuchu miny do 10 kg TNT)
PRZENIESIENIE NAPĘDU W BEZPIECZNYCH RUMORACH (Abrams-pattern)
DLACZEGO 1500 KM W ELEKTRYKU TO "KILLER FEATURE"?
POTĘŻNY MOMENT OBROTOWY (10,000 - 15,000 Nm)
POTĘŻNY MOMENT OBROTOWY Dostępny od 1 obr./min. "Czołg nie mieli, tylko wyskakuje"
REGENERACJA (REKUPERACJA) - Doładowanie baterii, oszczędność hamulców
ROZMIESZCZENIE W KADŁUBIE (Widok z góry i Przekrój)
Przód (Kapsuła)
Środek
Tył: Diesel zamontowany POPRZECZNIE
Środek: Baterie w podłodze - NISKI ŚRODEK CIĘŻKOŚCI
Boki: Silniki burtowe
WYZWANIE & ROZWIĄZANIE: CHŁODZENIE (THERMAL SIGNATURE)
PANCERZ JAKO WIELKI RADIATOR - Rozproszenie sygnatury termicznej
CHŁODZENIE CIECZĄ (GLIKOL/OLEJ) - Falowniki, kable
Tradycyjny czołg: Punktowy gorący wydech
CO Z DYMEM?
Diesel
Silnik na stałych, optymalnych obrotach -> Minimalna emisja
Brak "czarnej chmury" (Leopard/T-72)
The combustion engine (generator) operates at a constant, optimal speed. This prevents smoke from escaping during rapid acceleration (no "black cloud" like that of the T-72 or Leopard), making us more difficult to detect from the air.

Chapter 8

Here is the plan for acquiring and producing the "heart" of the tank:

1. Where to get it? (Immediate options)
Instead of looking for unique military engines, we aim for proven industrial and marine designs that have enormous torque and are unbreakable:

Option A (Partnership with Korea): Hyundai Doosan Infracore (DV27K). Since we're buying K2 tanks, the easiest way is to license their V12 engine (1500 hp). It's already adapted to Polish operating conditions.

Option B (German Reliability): MTU 880 Series. This is the "Mercedes" of tank engines. It is compact and ideal for connecting to a generator.

Option C (Scandinavian Smarts): Scania V8 (Marine/Industrial). Scania produces engines with power outputs up to 1150 hp. They're inexpensive to service, parts are readily available at

every Polish truck repair shop, and we only need about 1000 hp internal combustion engine to generate electricity for 1500 hp electric motors.

2. Where to produce it in Poland?
We have two key plants that can handle this:
PZL-Wola (Warsaw/Siedlce): Historically, this is where engines for the PT-91 were built. The plant would require a major modernization, but the staff and foundations for engine block production are in place.
Huta Stalowa Wola (Engine Division): HSW could take over the final assembly of parts (so-called CKD) from a foreign partner, gradually Polonizing production (body castings, crankshafts).

3. What to replace it with? (Alternative future)
If we don't want a classic diesel, our hybrid gives us a unique opportunity to:
Gas Turbine (like the Abrams, but smaller): The turbine is lighter and smaller than the diesel engine. As a power generator, it operates at a constant speed, eliminating its biggest drawback – the enormous fuel consumption upon takeoff. Production: Possible collaboration with the Diesel Engine Factory in Rzeszów (Pratt & Whitney).
Hydrogen (Fuel Cells): This is a "sci-fi" option, but a reality in 10 years. Instead of a combustion generator, we install stacks of hydrogen fuel cells. Zero noise, zero exhaust fumes, massive electricity.

4. What is potentially suitable for installation (Hybrid Bonus)?
Since we are building in Poland, the combustion engine connected to the generator can be equipped with:
Supercapacitors (Graphene-based): Produced by Polish companies, they allow for a "surge of energy" to be delivered to electric motors when a tank needs to suddenly move, reducing the load on the combustion engine.
Drive Specification Summary:
Component Type Production/Origin
Diesel Engine-Generator V8/V12 (1000 HP) MTU or Doosan License at HSW
High Voltage Generator (800V) ABB Aleksandrów Łódzki or Cantoni
Traction Motors 2x 550 kW (Electric) Komel (Katowice) / Cantoni
My proposal: We are going for a Korean license (Doosan) assembled at HSW, because politically and technically it is the easiest direction for Poland.

Chapter 9

Inverters are the "electrical brain" of the drive system. In a 1,500 hp, 800 V hybrid tank, they must control enormous currents in fractions of a second without overheating within the enclosed hull.

Here's how we can obtain, produce or replace them in Polish conditions:

1. Where to Get It (Off-the-Shelf Options)

Top Secret

Poland currently doesn't produce military-grade inverters with this power density. We must look to the SiC (Silicon Carbide) technology leaders:
USA (BorgWarner / Cascadia Motion): Their PM250 series of inverters are used in racing and military prototypes. They are small, rugged, and 800V-ready.
Israel (EVR Motors): They specialize in ultra-compact drive controllers. Collaborating with them would be the fastest way to integrate them into a combat system.
Korea (Hyundai Mobis): They have ready-made technology from civilian EV cars (Ioniq 6), which can be "militarized" (reinforced housing and cooling).

2. How to produce in Poland (Polonization)
This is a great opportunity for Polish companies in the power electronics industry:
APS Energia (Sulejówek) / Medcom (Warsaw): These are giants that make inverters for trains and trams.
Production plan: We would have to purchase the SiC power modules themselves (e.g. from Wolfspeed or Infineon), and Polish engineers would design the following for them:
Armored housing (sealed and shock-resistant).
Control software (key for the tank's AI to manage power smoothly).
Liquid cooling system (integrated with Section B of the hull).

3. What to replace (Contingency plan)
If we don't get state-of-the-art SiC inverters:
Classic IGBT inverters: They are about 40% larger and generate more heat. Instead of two small boxes, we would have to sacrifice more space in Section B and install more powerful fans. This would increase the tank's weight by about 200-300 kg.

4. Inverter Specification for PL-H1:
Operating voltage: 800V DC (optimal for fast charging and low losses).
Peak power: 600 kW per engine (total 1200 kW / ~1600 HP).
Cooling: Oil or glycol (forced).
Communication: CAN Bus / Military Ethernet (connection with SKO Argus-1).

Chapter 10

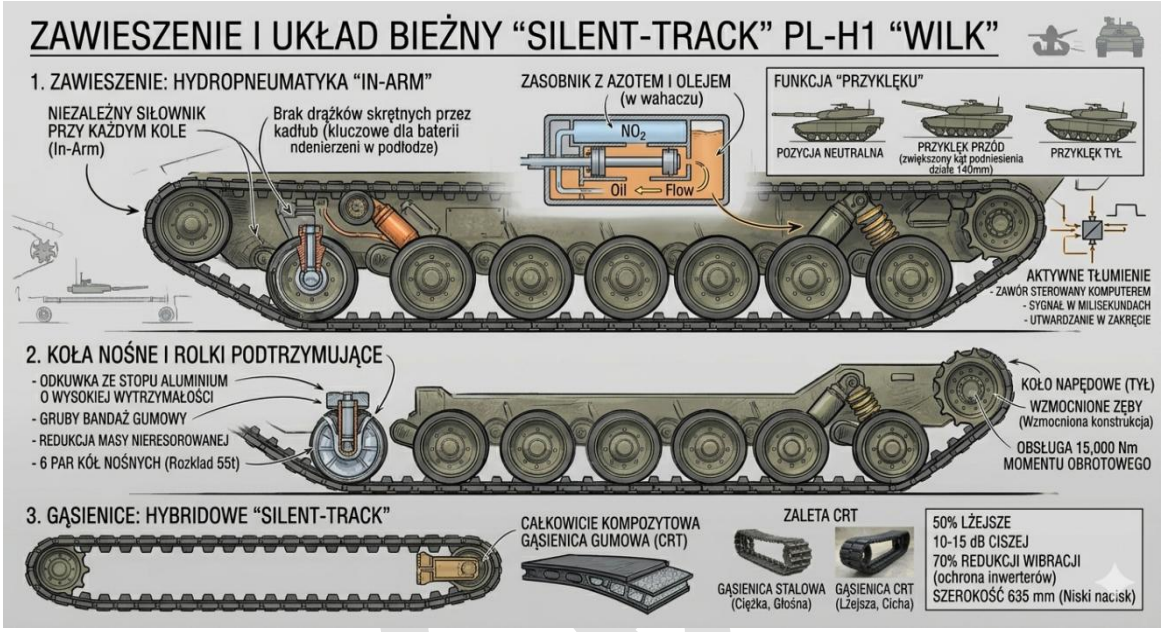
Here is the technical design of the chassis:

1. Suspension: Hydropneumatic "In-Arm"
Instead of rods running the full width of the fuselage (which would take up space for our 120 kWh batteries), we use independent actuators at each wheel.
Technology: We utilize Polish-Korean experience from the K2 tank. Each suspension arm has its own nitrogen and oil reservoir.
"Kneeling" Function: The tank can lower its front or rear. This is crucial for an unmanned turret, as it allows for increased elevation or depression of the 140 mm gun in difficult terrain.
Active damping: The on-board computer hardens the left-side suspension in milliseconds when the tank enters a sharp curve at full electric power.

2. Support Wheels and Rollers

Top Secret

Number: 6 pairs of large diameter load-bearing wheels (weight distribution 55 tons on the ground).
Material: High-strength aluminum alloy forgings with a thick rubber surround. Using aluminum instead of steel reduces unsprung mass, allowing the suspension to react more quickly to bumps.
Drive Gear (Rear): Specially reinforced teeth to withstand the monstrous torque (15,000 Nm) generated by the electric motors from 0 rpm.


ZAWIESZENIE I UKŁAD BIEŻNY "SILENT-TRACK" PL-H1 "WILK"
1. ZAWIESZENIE: HYDROPNEUMATYKA "IN-ARM"
NIEZALEŻNY SIŁOWNIK PRZY KAŻDYM KOLE (In-Arm)
Brak drążków skrętnych przez kadłub (kluczowe dla baterii ndenierzeni w podłodze)
ZASOBNIK Z AZOTEM I OLEJEM (w wahaczu)
NO2
Oil
Flow
FUNKCJA "PRZYKLĘKU"
POZYCJA NEUTRALNA
PRZYKLĘK PRZÓD (zwiększony kąt podniesienia działa 140mm)
PRZYKLĘK TYŁ
AKTYWNE TŁUMIENIE
- ZAWÓR STEROWANY KOMPUTEREM
- SYGNAŁ W MILISEKUNDACH
- UTWARDZANIE W ZAKRĘCIE
2. KOŁA NOŚNE I ROLKI PODTRZYMUJĄCE
- ODKUWKA ZE STOPU ALUMINIUM O WYSOKIEJ WYTRZYMAŁOŚCI
- GRUBY BANDAŻ GUMOWY
- REDUKCJA MASY NIERESOROWANEJ
- 6 PAR KÓŁ NOŚNYCH (Rozklad 55t)
KOŁO NAPĘDOWE (TYŁ)
WZMOCNIONE ZĘBY (Wzmocniona konstrukcja)
OBSŁUGA 15,000 Nm MOMENTU OBROTOWEGO
3. GĄSIENICE: HYBRIDOWE "SILENT-TRACK"
CAŁKOWICIE KOMPOZYTOWA GĄSIENICA GUMOWA (CRT)
ZALETA CRT
GĄSIENICA STALOWA (Ciężka, Głośna)
GĄSIENICA CRT (Lżejsza, Cicha)
50% LŻEJSZE
10-15 dB CISZEJ
70% REDUKCJI WIBRACJI (ochrona inwerterów)
SZEROKOŚĆ 635 mm (Niski nacisk)

3. Tracks: Hybrid "Silent-Track"
In a hybrid tank, the tracks must be silent so as not to give away the position in electric mode.
Type: Steel tracks with replaceable rubber pads (so-called asphalt tracks) or fully composite rubber tracks (CRT).
CRT advantage: They are 50% lighter and 10-15 dB quieter than steel ones. They reduce vibration by 70%, which protects our delicate power electronics (inverters).
Width: 635 mm (ensures low specific ground pressure, allowing driving on peat bogs and mud).

4. What do we have and what do we need to buy?
Component Where to get it / How to produce it? Status in Poland
Control Arms and Wheels Huta Stalowa Wola (machining) MAMY (Borsuk Line)
Hydropneumatic Actuators Licensed by Hyundai Rotem (Korea) FOR BUY (License)
CRT Tracks Import Soucy Defense (Canada) FOR BUY (Import)
Seals Production at the Rubber Plant (Sanok) WE HAVE

5. Cost and Time of Chassis Construction
Cost of the set (6 pairs of wheels + tracks + suspension): approx. PLN 8-10 million.
Production time: Approx. 6 months from casting to finished chassis kit.

6. How to replace the deficiencies?

If licensing for hydropneumatics were too expensive, we could use modified torsion bars from the PT-91 tank, but we would have to move the batteries from the floor to the sides of the hull, which would compromise the tank's stability. It would be better to invest in an "In-Arm" system. 1.A.

Chapter 11

Final drives are the final link in the drivetrain – they convert the rotation of the electric motors into the powerful force that pulls the 55-ton tank out of the mud. Electric motors face a greater challenge than diesels, as full torque reaches the gears immediately (0.1 second after pressing the pedal).

Here's how we build this element in the PL-H1 Panthera:

1. Where to get it (License options)
Poland currently doesn't have a final drive ready for a 1500 HP electric drive. The most sensible move is a partnership:
Germany (Renk Group): A world leader. Their transmissions are found in Leopard tanks and the new Puma IFV. They have ready-made solutions for hybrid drives (HSWL series). We are purchasing a license for the documentation and tooth hardening technology.
Italy (Iveco Defence / Leonardo): They have extensive experience in high-speed wheeled and tracked vehicles. Their transmissions are lighter, which suits our 55-ton weight.

2. Where to produce in Poland (Industrial base)
Huta Stalowa Wola (HSW): This is a natural choice. HSW already produces gears for Krab and Borsuk trucks. They have powerful CNC machining centers that, when equipped with new milling heads, can cut gears of extreme hardness.
Stal-Systems (Stalowa Wola): A private company specializing in precision gears that works with the military. They could be a subcontractor for the most demanding internal components.

3. Production Technology (What we need to implement)
The final drive must withstand pressure that would crush ordinary steel.
Ni-Cr-Mo alloy steel: We have to import or smelt in Poland special nickel-chromium-molybdenum steel.
Carburizing and Nitriding: These are chemical processes that make the tooth surface as hard as a diamond, while the core remains flexible (so the tooth doesn't break under the impact of 1500 HP).

4. What to replace (Contingency plan)
If the Renk license proves too expensive, we could try scaling up the gearboxes from the Polish Krab howitzer. They are designed for 1,000 hp and a weight of 50 tons. Reinforcing their housing and changing the gear ratios to accommodate the electric motor will require HSW engineers to undertake approximately 12-18 months of research.
Specifications of the PL-H1 final drive:

Top Secret

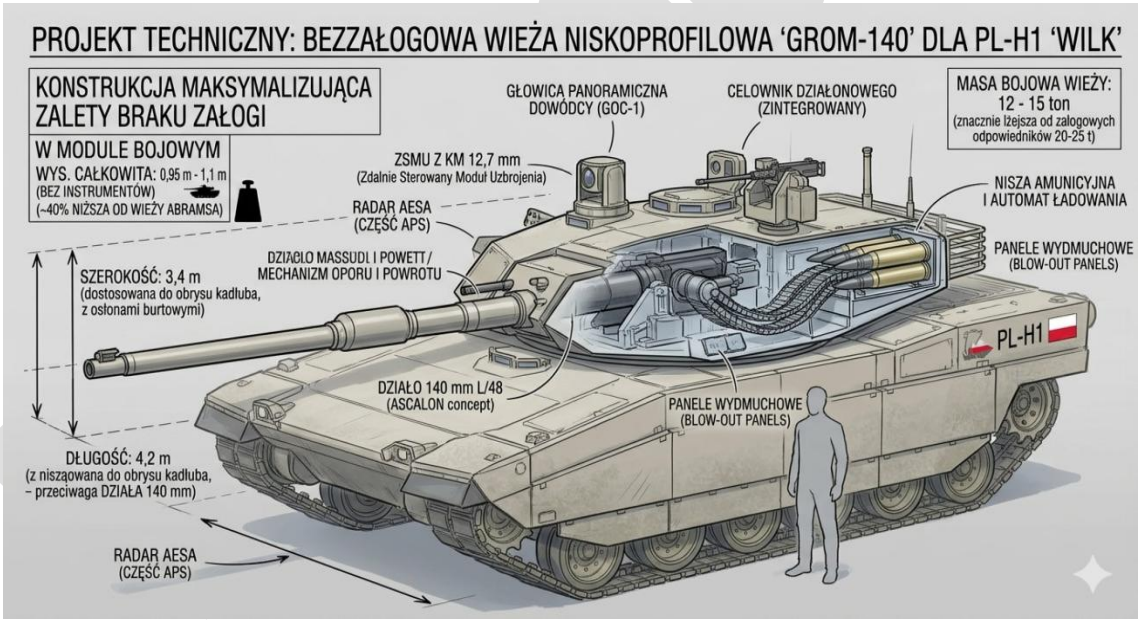
Gear ratio: Approx. 1:4 to 1:6 (reduction of electric motor speed to the powerful crawler force).
Durability: Torque of 15,000 - 18,000 Nm.
Lubrication: Forced system with its own oil cooler (integrated with the C Section system).

Chapter 12

Here is the "Grom-140" turret design for your tank: PL-H1 "Wilk"

1. Gun: The most powerful beast – 140 mm L/48 (Smoothbore)
This isn't just any gun. It's a cannon with muzzle energy 50-70% greater than that of the Leopard or Abrams.
Where to get them? Realistically: Collaboration with the Franco-German KNDS concern (ASCALON project) or purchasing a license for the XM291 technology from the Americans. In Poland, Huta Stalowa Wola could produce barrels using drop forging technology.
Ammunition: APFSDS projectiles, nearly a meter long. They penetrate over 1000 mm of solid steel at a distance of 2 km. No armor in the world can withstand this.
Muzzle Brake: A special "basket" at the end of the barrel that disperses gases to the sides, reducing the terrible recoil by 30% to prevent the turret from being torn out of the ring.

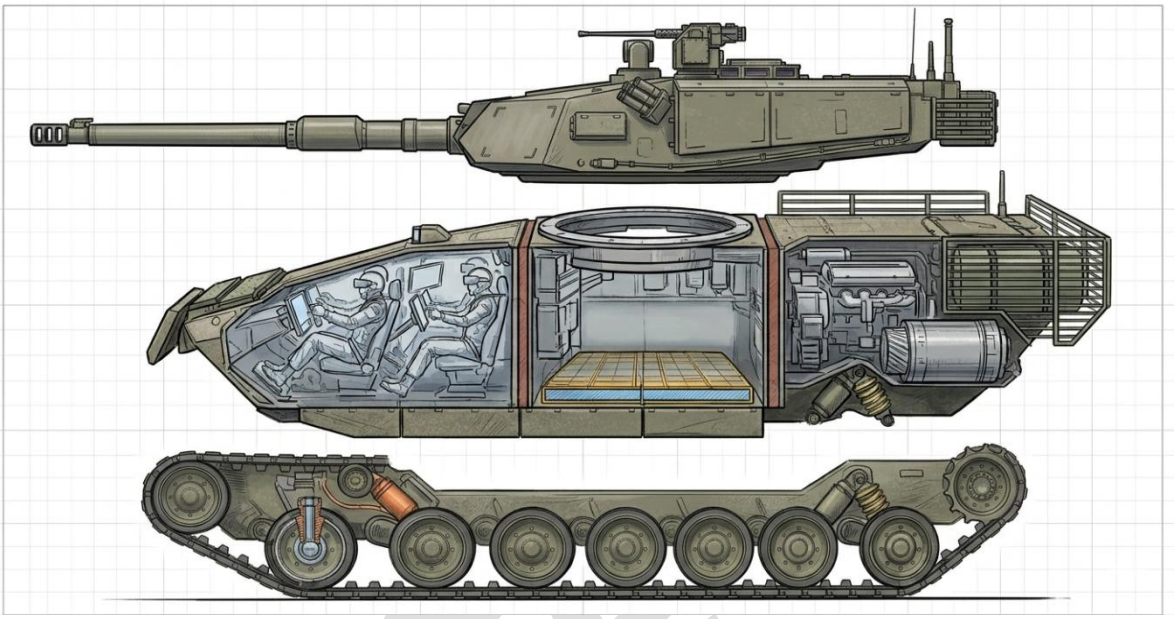
2. Unmanned Pancake Tower (Low Profile)


PROJEKT TECHNICZNY: BEZZAŁOGOWA WIEŻA NISKOPROFILOWA 'GROM-140' DLA PL-H1 'WILK'
KONSTRUKCJA MAKSYMALIZUJĄCA ZALETY BRAKU ZAŁOGI
W MODULE BOJOWYM
WYS. CAŁKOWITA: 0,95 m - 1,1 m
(BEZ INSTRUMENTÓW)
(~40% NIŻSZA OD WIEŻY ABRAMSA)
GŁOWICA PANORAMICZNA DOWÓDCY (GOC-1)
CELOWNIK DZIAŁONOWEGO (ZINTEGROWANY)
MASA BOJOWA WIEŻY: 12 - 15 ton
(znacznie lżejsza od załogowych odpowiedników 20-25 t)
ZSMU Z KM 12,7 mm
(Zdalnie Sterowany Moduł Uzbrojenia)
RADAR AESA
(CZĘŚĆ APS)
NISZA AMUNICYJNA I AUTOMAT ŁADOWANIA
PANELE WYDMUCHOWE
(BLOW-OUT PANELS)
DZIAŁO MASSUDI I POWETT / MECHANIZM OPORU I POWROTU
SZEROKOŚĆ: 3,4 m
(dostosowana do obrysu kadłuba, z osłonami burtowymi)
PL-H1
DZIAŁO 140 mm L/48
(ASCALON concept)
PANELE WYDMUCHOWE
(BLOW-OUT PANELS)
DŁUGOŚĆ: 4,2 m
(z niszą owana do obrysu kadłuba, – przeciwaga DZIAŁA 140 mm)
RADAR AESA
(CZĘŚĆ APS)

The turret is very low because it does not have to accommodate the crew's heads.
Drive: 100% electric (High-Voltage Servo). 360-degree rotation in 4.5 seconds.
Ammunition Storage (Niche): All ammunition (approx. 22-25 rounds) is located in the "tail" of the turret.
Insulation: It is separated from the hull by an armored bulkhead.
Safety: There are blowout panels on top. If the ammunition detonates, all the force goes up. The tank loses its gun, but the crew in the capsule doesn't even get hurt.

3. "Eyes of the Monster" - Targeting Systems (Polish Production)
Here we assemble what we have best in Poland (PCO SA):

Commander's Panoramic Head (GOC-1): High above the turret. 3rd generation thermal imaging (sees the tank's silhouette from 10 km in total darkness) + laser rangefinder.
Gunner's Sight: Independent, integrated with ballistic computer.
"Silent Hunter" System: The commander finds a target at night, marks it on the screen, and the turret automatically rotates and fires while the commander is already searching for the next target (Hunter-Killer mode).



4. "Mega Monster" equipment on the tower:
ZSMU (Remotely Controlled Weapons Module): On the roof, a Polish 12.7 mm machine gun for destroying drones and manpower.
AESA Radars (4 each): Small panels on the sides of the turret that detect incoming missiles (part of the Active Protection System).
Laser Anti-Radiation Beacon (OBRA-3): If an enemy aims a laser at you, the tank automatically fires smoke grenades and informs the crew where the threat is coming from.
Grom-140 Tower Specifications
Element Parameter Function
140 mm Smoothbore Gun "One shot, one kill" - destroys everything
Night Vision/Thermo Generation III (Cooled) Night vision as day (4K image)
Automatic Loader Double-belt Loading a bullet in 5 seconds
360° Vision Spherical camera system The crew in the capsule sees the image around the tower

Here are the detailed technical specifications for the unmanned low-profile turret for the PL-H1 "Wilk" project. The design maximizes the benefits of having no crew inside the combat module.

1. Dimensions and Weight
Overall height (without instruments): 0.95 m – 1.1 m (extremely low profile, approx. 40% lower than the Abrams turret).
Width: 3.4 m (adapted to the hull outline, with side covers).

Length (with ammunition niche): 4.2 m (extended rear section for gun counterweight).
Combat weight: 12 – 15 tons (significantly lighter than manned counterparts weighing 20-25 tons).

2. Main and Auxiliary Armament
Gun: 140 mm ASCALON (L/48 or L/51).
Barrel shroud: Composite-laminate (reduces weight by 25% and reduces thermal error).
Lifting angles: from -10° to +20° (thanks to high torque actuators).
ZSMU (Remotely Controlled Weapons Unit): Mounted centrally on the roof.
Type: Polish ZSMU A3/A5 (Tarnów).
Armament: WKM-B 12.7 mm machine gun.
Coupling machine gun: UKM-2000C 7.62 mm mounted on the right side of the gun.

3. Warehouse and Loading Machine
Location: Rear turret niche (insulated by an armored bulkhead).
Type: Belt-fed (horizontal) – 22 140 mm rounds ready to fire.
Safety: Blow-out panels on the upper surface of the niche (dimensions: 1.2 mx 0.8 m).

4. Optoelectronic Systems (“Senses”)
Commander's Panoramic Head (GOC-1): Independent, mounted on a pedestal, 360° rotation.
3rd generation thermal imaging + laser rangefinder (detection range 10 km+).
Gunner's Sight: Integrated with the gun mask, fixed relative to the barrel axis.
Spherical Vision System: 6 small camera modules placed on the corners of the turret (360° image for the crew in the hull).

5. Protection and Defense
Armor: Layered (Steel-Ceramics-Composite) + ERAWA-3 knuckles on the front and sides.
Smoke Grenade Launchers: 2x4 81 mm launchers integrated with the OBRA-3 system.
AESA Radars (4 pcs.): Small panels (20x20 cm) monitoring the surroundings for incoming missiles (Hard-Kill).
WRE Jammer: Rod antenna for jamming drones (height approx. 0.6 m).

6. Propulsion and Stabilization
Slewing bearing: Inner diameter 2150 mm.
Slewing motors: 2x Direct Drive (Torque Motors) – silent, 800V drive.
Stabilization: FOG fiber optic gyroscopes (precision up to 0.1 milliradian).
The PL-H1 turret, thanks to its low silhouette and lack of crew, is extremely difficult to detect and hit, and its powerful 140 mm gun makes it the most dangerous combat module in the modern theater of operations.

Chapter 13

Here is what we additionally install on the Grom-140 tower:

1. Integrated Drone Port (UAV Launcher)
Instead of requiring the crew to exit the tank, the turret has its own "mini-flight station."

Top Secret

What is it: 2-4 small reconnaissance drones (Warmate type or smaller tilt-rotor drones) hidden in armored tubes on the side of the turret.
Function: The commander deploys a drone, which hovers 500 meters above the tank. The drone's image is transmitted directly to the crew's VR headset. You can see the enemy behind a forest or hill before they hear you.
Parameter: Reconnaissance range increases from 5 km to 15 km.

2. Acoustic Shot Detection System (Pilar)
What it is: An array of highly sensitive microphones located on a tower.
Function: When a sniper or ATGM launcher fires a shot at you, the system calculates in a split second where the shot came from and automatically turns the 140 mm barrel in that direction.
Advantage: The crew does not have to look for the enemy - the tank itself "shows with a finger" who is shooting at us.

3. Laser Dazzle System (Soft-Kill APS)
What it is: A high-power laser beam emitter coupled to optics.
Function: If the tank's systems detect that an enemy ATGM operator (e.g. Kornet) is aiming at us through his sight, our laser blinds his optics and eyes, preventing him from guiding the missile.
Power consumption: High (but we have a hybrid, so that's not a problem).

4. Independent Anti-Aircraft System (C-UAS)
In addition to the main 140 mm gun, we mount a dedicated unit on the turret roof for destroying FPV drones.
Equipment: Multi-barrel machine gun (Gatling) 7.62 mm or Polish propelling rifle.
Automation: The module has its own small radar and tracks incoming drones on its own, shooting at them without the gun operator's involvement (he is aiming the 140 at another tank at the same time).

5. Identification System "Friend or Foe" (IFF)
What is it: Active panels that transmit an encoded signal.
Function: Prevents friendly fire. Your turret automatically blocks the trigger if you aim at an allied Polish tank that has the same transmitter.

6. High Power Infrared Illuminator (Active IR)
Function: Although we have passive thermal vision, in extreme conditions (dense fog, sandstorm) we can "illuminate" the battlefield with IR light invisible to the human eye, seeing the enemy clearly.
Add-ons Table (Tower Options)
Module Mass Function Do we have it in Poland?
Drone Port +150 kg Obstacle Seeing YES (WB Electronics)
Acoustic System +20 kg Sniper Detection YES (Technology available)
C-UAS module +250 kg Anti-drone shield YES (Zakłady Tarnów)
Laser Soft-Kill +80 kg Blinding of missile operators YES (Institutes of Optoelectronics)
Tower Summary:

Top Secret

We have an unmanned 140mm monster that can automatically detect shots, destroy drones, blind enemy missiles, and project its own "eyes" into the air. Thanks to the hybrid, all of this operates more quietly and for longer than any other tank.

Chapter 14

Here's how we can play it out in Polish reality:

1. Where to get technology (Real sources)
Developing a 140mm gun from scratch would take Poland 15-20 years. We must pursue licensing:
Option A (France/Germany): ASCALON System (KNDS). This is a state-of-the-art 140mm gun designed for a future European tank (MGCS). It is designed to have less recoil than the 120mm, which is ideal for our 55-ton hybrid [1, 2].
Option B (Germany): Rheinmetall 130 mm/140 mm. Germany has a ready-made demonstrator of a 130 mm gun (L/51), which can be scaled to 140 mm. Cooperation with them provides access to the best steel in the world [3].

2. How to start production in Poland? (Huta Stalowa Wola)
We do not buy "ready-made barrels", we buy forging and machining technology:
Step 1: Invest in a modern autofrettage line (strengthening the barrel from the inside with enormous pressure) at HSW.
Step 2: Purchase of semi-finished products (forgings) from a partner (e.g. French Aubert & Duval), and final heat treatment and threading in Poland.
Step 3: Integrating the barrel with our Polish autoloader in Section B.

3. Specifications of the "140mm Beast"
Barrel length: approx. 48-52 calibers (nearly 7 meters).

Muzzle energy: approximately 20-25 MJ (megajoules). For comparison: the Leopard 2 has approximately 13 MJ. This means it can penetrate any armor at a distance of 4 km [2].
Telescopic ammunition: The bullet is "hidden" in the casing, which shortens the entire cartridge. This allows for a smaller autoloader [4].

4. What to replace if 140mm is too expensive?
If the budget breaks, we have Plan B:
L55A1 120 mm (NATO Standard): The most modern version of the Leopard gun. We already have ammunition and support for it in Poland.
120mm High-Pressure Gun: We use the standard caliber, but we reinforce the barrel with composite (the laminates mentioned earlier), which allows us to fire more powerful charges without increasing the turret's weight.

5. What else is "extra" for the tower?
To make the 140 even more effective, we add:
Castle Shell Programmer: Allows you to set whether the shell will explode over a trench, inside a building, or after penetrating armor.
Barrel with carbon fiber heat shield: What you mentioned – a "laminate" that makes the gun look powerful, doesn't bend in the sun, and is several hundred kilograms lighter.

Chapter 15

Here's how we build Shock-Proof Enclosures:

1. Construction of the housing (Physical protection)
Material: Milled block of aircraft aluminum or titanium (lightness + stiffness).
Shielding: Copper and mu-metal layer to prevent electromagnetic pulses (EMP) from interfering with the gyroscopes.
Tightness: IP68 standard – electronics must work in dust, mud and under water when wading.

2. Sensor Suspension System (Internal)
We do not mount the gyroscope "rigidly" to the housing.
Vibration Isolators: Special polymer "cushions" (elastomers) with variable density. They absorb the shock wave of a 140 mm shot before it reaches the glass fibers of the FOG gyroscope.
Silicone Potting: The entire interior of the electronics enclosure is filled with a special thermally conductive resin. This protects the components from being torn off the circuit boards during a shock.

3. Where to get it / How to produce it?
Polish Production: Yes, we have companies such as Radmor and WB Electronics that can build military-grade enclosures (MIL-STD-810).
Shortcomings: We lack in Poland advanced test vibration tables (Shaker Tables) on such a large scale as to simulate the recoil of a 140 mm gun.
Solution: We would have to carry out the durability tests in the WAT laboratories or at the gun partner's (e.g. in France at KNDS).

Top Secret

4. What to replace if Polish housings fail?
Foreign option: Purchase of ready-made "safety cages" for sensors from Lord Corporation (USA) – they are a world leader in vibration damping for tanks and missiles.

Chapter 16

Here is the design of the Polish universal loading machine "Modular-Loader XT":

1. Construction: Cassette-Based System
Instead of building a machine for a specific cartridge, we build a mechanism that supports interchangeable cartridges.
How it works: Ammunition is stored in vertical or horizontal cartridges (like a magazine in a pistol). If you upgrade from a 120mm to a 140mm gun at the factory, you only replace the guides and the "gripper" (pusher), while the entire elevator design remains the same.
Location: Rear niche of the unmanned turret (Section B/C of the turret).

2.Types of machines for each type of work:

A. For 120 mm (NATO Standard)
Type: Conveyor.
Capacity: 28-34 pieces.
Specifics: Very fast. Thanks to the lighter cartridge weight (~20 kg), the elevator can feed rounds every 4 seconds.
Advantage: Largest ammunition supply in the turret.

B. Dla 130 mm (Rheinmetall)
Type: Drum or Drawer.
Capacity: 22–26 pieces.
Specifics: The cartridges are approximately 20 cm longer than the 120 mm. The automatic must have a telescopic pusher that will push such a long bullet into the chamber without jamming the breech.
Advantage: Perfect compromise between rate of fire and firepower.

C. For 140 mm (ASCALON - Best choice)
Type: Revolver with telescopic ammunition (CTA).
Capacity: 20-22 pieces.
Specifics: Because ASCALON projectiles are "short and thick" (telescopic), the machine gun can be smaller and more armored.
Advantage: Simplest mechanics. Less chance of the projectile jamming during feeding.

3. Why is our machine "Intelligent"? (AI Integration)
Since we have the Argus-1 SKO system, the machine is connected to it digitally:
Target Selection: The Commander selects the target: "Bunker".
AI Decision: The computer tells the machine: "Load a high-explosive (HE) shell."

Top Secret

Implementation: The machine itself searches for the appropriate cartridge in the cartridge and loads it before the operator can blink.
Safety: If the machine detects a fault (e.g. a crooked cartridge), it automatically ejects it through the lower service hatch and feeds the next one.

4. What can we produce in Poland?
Huta Stalowa Wola already produces automatic machines for the Rak mortar and the ZSSW-30 turret.
Challenge: Scaling this to heavy tank ammo.
Solution: We make the automatic drive electric (using electricity from the hybrid), which is more precise and lighter than the old hydraulics.
Universal Machine Specifications:
Parametr 120 mm 130 mm 140 mm (ASCALON)
Charging speed 4-5 sec 6-7 sec 5-6 sec
Masa mechanizmu ~1200 kg ~1500 kg ~1300 kg
Drive Stepper Motors (Electric) Stepper Motors Stepper Motors
Protection Armored bulkhead Armored bulkhead Armored bulkhead
In summary: We're designing a single "elevator" and variable "baskets" for ammunition. This is the cheapest and most versatile solution for Polish industry.

Chapter 17

Gun stabilization is the "holy grail" of accuracy. With a 140 mm gun and electric drive, traditional hydraulic systems (free-fire and fire) are out of the question. We must rely on digital electric stabilization (All-Electric Gun Drive).

Here's how we build this system in the Polish context:

1. The heart of the system: Fiber Optic Gyroscopes (FOG)
They are the ones that detect the slightest vibration of the hull (even a fraction of a degree).
Polish Production: Yes! We have it. PCO SA (Warsaw) and institutes such as the Military University of Technology and the Polish Institute of Technology (Łukasiewicz Network) possess fiber optic and laser gyroscope technology. They are used in missile guidance systems and optoelectronic warheads.
How to produce: We need to scale up sensors from anti-aircraft systems (Grom/Piorun) to an "armored" version, resistant to the powerful recoil shock of a 140mm gun.

2. Manufacturers: Direct Drive Stepper Motors
The sensor is only half the battle – we need powerful electric motors (servos) to keep the barrel on target.
Polish Production: We can manufacture these at Komel (Katowice) or Cantoni Group plants. They design high-torque engines.
Technology: We need brushless motors (BLDC). Instead of gears that have "backlash," the gun should be directly driven (Direct Drive), which allows for millimeter-level precision.

Top Secret

3. Brain: Stabilization Controller (Digital Control Unit)
Polish Production: Absolutely WB Electronics. They write the algorithms for the ZSSW-30 (Borsuk) turret.
Function: The computer collects data from gyroscopes on the hull and gyroscopes on the barrel, then corrects the gun's position thousands of times per second. The hybrid system provides constant, stable voltage (800V), allowing the motors to respond instantly.

4. Where can we get it if we can't do it ourselves? (Backup options)
If the Polish engines prove to be too imprecise for the 140 mm caliber:
Where to get it: Swiss company CURTISS-WRIGHT (their drives are standard in Leopards and Abrams).
What to replace: You can buy just the "ring motors" from Germany (Jenoptik), and then supply all the control electronics and gyroscopes from Poland (PCO/WB). This is the most common model of cooperation.
PL-H1 Stabilization Specifications:
Polish Production? Function
FOG Sensor YES (PCO) Hull Motion Detection
Elevation Motor YES (Komel/Cantoni) Gun Raising/Lowering
Controller (AI) YES (WB Electronics) On-the-fly correction calculation
Power Supply YES (Hybrid) Clean energy 800V without voltage drops

5. Innovation: Pothole "Prediction"
Thanks to 360-degree spherical cameras and AI, our stabilization system can "see" the terrain in front of the tank. If the tank is approaching a pit, the computer already prepares the stabilization motors for a shock before it occurs. This is called feed-forward control – the stabilization of the future.

Chapter 18

These are the final two "missing links" for Polish electronics to survive a 140mm cannon blast. We must combine polymer chemistry with rigorous test engineering.

1. Specialized Damping Polymers (Elastomers)
These are materials that "absorb" the energy of an impact instead of transmitting it further.
Where to get it (Import): The leaders are the American Lord Corporation (BTR series - Broad Temperature Range) or the Japanese Geltec (αGEL plates). These are materials used in space rockets.
How to produce in Poland: The key lies with the Łukasiewicz Research Network – Institute of Engineering of Polymer Materials and Dyes (Toruń/Gliwice). Polish chemists can develop polyurethanes with high energy dissipation.
What to replace it with: Multi-layer sorbothane pads (imported from the USA) can be used temporarily, but ultimately we need to outsource the production of dedicated "vibration isolators" to companies such as Sanok Rubber Company (they have the machinery, they just need the chemical "recipe").

2. Test Stands (Shaker Tables) under 140 mm
We need to simulate the monster's "kick" before we install the sensors in the tank.
Where to Get It (Machines): The most powerful electrodynamic exciters are manufactured by LDS (HBK) (UK/Germany). These are truck-sized devices that can shake a 500 kg object at an acceleration of 100 G.
Where to produce/Find in Poland:
Military University of Technology (WAT): They have laboratories for testing shock resistance, but may require additional equipment with higher frequency heads.
Institute of Aviation (Łukasiewicz - Warsaw): They have the best vibration test stands for jet engines in the region. That's where we should test our "armored boxes."
Research and Development Centre for Mechanical Devices (OBRUM): The Gliwice facility, which should naturally become a testing center for the chassis and turret.

3. Action Plan (Short):
Chemistry: Order for Łukasiewicz to develop the "Panthera-Gel" polymer.
Production: Casting of finished washers in Sanok.
Testing: Using the Institute of Aviation infrastructure to certify enclosures.2,D.

Chapter 19

1. Where to get it (World Options)
Option A (Germany): Jenoptik (Vincennes) – a world leader. Their engines power the turrets of the Leopard 2A7. They are reliable but very expensive and require approval from the German government.

Top Secret

Option B (USA): Moog Inc. – supplies the drives for the Abrams X. This is space-age technology, incredibly precise.

Option C (Slovenia/EU): Pipistrel / Emrax – They make powerful slip-ring engines for electric aircraft. They could be adapted to the turret.

2. How to produce in Polish conditions?
This is the moment when Polish industry must reach a higher level:
Plant: Komel (Katowice) – This is the Polish center for electric drives. They design engines for mining and the military. They would need funding to build a precision winding line for large-diameter coils (over 2 meters).
Collaboration: Cantoni Group – they could supply high-quality copper and housings, but the Institute of Electrical Drives and Machines must be responsible for the “Direct Drive” project.

3. What to replace (Contingency Plan)?
If the 2-meter slip-ring motor proves too difficult to manufacture in Poland:
Distributed Drive: Instead of a single large motor, we install four smaller Torque motors with high-precision gears, spaced 90 degrees around the turret. This is easier to manufacture in-house, yet provides similar firepower and fluidity.

4. Specifications for PL-H1:
Torque: approx. 50,000 - 80,000 Nm (it must "jerk" 15 tons of steel in a fraction of a second).
Power supply: 800V DC (directly from your batteries).
Cooling: Water jacket integrated with the ring (draws cooling from the Section B system).

Chapter 20

Ammunition stowage in a hybrid tank with an unmanned turret is a key safety feature. Our PL-H1 Panthera utilizes a two-stage system: a First-Element Ammunition Magazine (in the turret) and a Reserve Ammunition Magazine (in the hull).

Here's how we'll lay it out in Section B and the tower:

1. First-Row Warehouse (Tower Niche)
This is where the ammunition is stored, ready for immediate firing.
Location: Rear part of the unmanned turret (so-called niche).
Capacity: 22 140 mm shells arranged horizontally on a conveyor belt.
Safety: The entire niche is separated from the hull by an armored bulkhead. The turret roof is equipped with weak links (blow-out panels). If the ammunition is hit, the explosion erupts upward, leaving the hull, crew, and batteries intact.

2. Reserve Magazine (Hull Section B)
This is an ammunition "vault" from which the automatic replenishes the turret's supply at safe moments.
Location: Mid-hull, directly below the turret but above the battery level.

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Capacity: Extra 10-14 rounds.
Layout: Vertical armored tubes. The missiles are hidden deepest in the tank, surrounded by side armor and batteries below (which act as additional cover).
Transfer: A special elevator (feeder) transfers the projectile from the hull to the automatic unit in the turret.

3. Energy vs. Fire Separation
In Section B we must avoid contact of ammunition with the high voltage installation:
Shielding: The ammunition magazine in the hull is enclosed in a tight "box" made of 20 mm steel sheet.
Thermal Insulation: A layer of fire-resistant material (aerogel) is placed between the magazine and the LG batteries. Even if the batteries overheat, the heat will not reach the ammunition's propellant charges.

4. What we have and what we lack (Short list):
We have: Technology for building an armored turret niche (experiences with ZSSW-30).
Missing: A precise elevator system feeding 140 mm shells from the hull to the turret (requires design from scratch at HSW).
Deployment Summary:
Location Quantity Access type Security
Tower Niche 22 pcs. Automatic (Direct) Blow-out panels
Center Hull 12 pcs. Elevator (Supplementary) Thickest side armor
Thanks to this arrangement, the tank has a total of 34 powerful 140 mm guns, which is a devastating result considering such firepower.

Chapter 21

A critical design element, this ring is the basis for the entire recoil force of the 140 mm gun, which generates hundreds of tons of pressure when fired. In a classic tank, the bearing is approximately 2 meters in diameter – in our case, it must be extremely durable to prevent the turret from being "sheared" from the hull.

Here's how to obtain and craft a Turret Ring Bearing:

1. Where to get it (World Options)
Currently, only a few companies can cast and grind a steel ring of this diameter with such precision:
Option A (Germany): ThyssenKrupp Rothe Erde. The absolute leader. Their bearings are used in Leopard and Abrams tanks. It's a proven technology, but expensive.
Option B (France): Defontaine (Rollix). They supply bearings for Leclerc tanks. They have ready-made solutions for 120/140 mm caliber.

2. How to produce in Polish conditions?
Poland has a bearing industry, but we need to scale it up:

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Plant: Fabryka Łożysk Tocznych (Kraśnik) or NSK Bearings (Kielce). They have machinery, but require powerful vertical lathes and an induction hardening facility for rings with a diameter of 2.2–2.5 meters.
Technology: The bearing must be three-row (roller) to withstand the enormous vertical (turret mass) and horizontal (gun recoil) forces.

3. What to replace (Plan B)?
If it is not possible to produce one large bearing of extreme hardness:
Segmented Bearing: Instead of a single casting, we use a system of segments (guides), which is easier to replace and repair, but requires incredible precision of assembly in HSW.

4. Specifications for PL-H1:
Inner diameter: approx. 2150 mm.
Material: 42CrMo4 alloy steel, induction hardened on raceways.
Integrated Gearing: The ring gear must be cut from the inside for our Direct Drive motors to rotate it.

Chapter 22

Auto project System "Argus-1" (AI-Driven Fire Control):

1. Sensor Fusion
The on-board computer collects signals from each sensor on the tank and combines them into a single image.
Virtual Reality (VR/AR): The crew in the pod wears goggles or spherical screens. External cameras allow them to see "through the armor." If the system detects an enemy behind a building wall (using radar or drone data), a red outline of the target appears on the operator's screen, even if the target is physically invisible.

Automatic Targeting (ATR): The AI scans the 360° image and automatically marks targets: "T-90 Tank (98% confidence)", "Infantry with RPG launcher (85% confidence)". The operator simply clicks "Confirm" and the turret rotates in a fraction of a second.

2. Hunter-Killer-Swarmer Algorithm
Thanks to the unmanned turret and automation, our FCS goes a step further than the Leopard:
Hunter-Killer Mode: The Commander marks target 1, the Operator destroys it with the 140mm gun. At the same time, the AI locks on targets 2 and 3.
Threat prioritization: If an FPV drone approaches from the side, the AI doesn't ask for your opinion - the system automatically controls the anti-aircraft module (C-UAS) on the turret roof to shoot it down, while the 140mm gun continues to target the enemy tank.

3. Assisted Ballistics (Precision Strike)
At 140mm caliber, each shell is expensive, so we have to hit it right the first time.
Dynamic correction: The computer collects data on barrel temperature (from sensors on the laminate), wind force, pressure and even air humidity.
Movement Prediction: AI calculates the target's path and suggests a lead point to the operator. First-shot accuracy on the move at a range of 4 km is above 90%.

4. Technical Parameters of the "Brain":
Feature Technical Description Benefit
Time from detection to shot < 1.5 seconds We are faster than any Russian/Western tank
Number of Tracked Targets Up to 50 at a time Full control over the chaos of battle
Drone Integration Drone image = shooting data Possibility to shoot at targets not directly visible (Indirect Fire)
IFF (Friend-Foe) Digital Radio Interrogation System Zero Mistakes and Friendly Fire

5. Components (What we actually assemble):
Computers: Industrial high-performance processors (e.g., NVIDIA Orin military-grade) mounted in liquid-cooled Section B.
Software: Written by Polish programmers from WB Electronics (creators of the TOPAZ system). This ensures no backdoors and full control over the code.
Are we now working on "Net-Centricity" (how your tank communicates with other units on the battlefield), or are we moving on to turret-mounted missile systems to complement the 140's power?

Top Secret

Chapter 23

Polish Battlefield Management System

1. Polish Battlefield Management System (BMS) – TOPAZ-NextGen
We do not buy a foreign system because we do not want anyone to have the "key" to our data.
3D Digital Map: Crew screens display the terrain with the positions of all friendly units (blue icons) and detected enemies (red).

Target Sharing: If your commander spots an enemy column, he clicks "Share" on the screen. The coordinates are then shared with other tanks and artillery, allowing them to fire at a target they can't physically see.

2. Software Defined Radios (SDR)
We use Polish COMPLEN (Radmor) radio stations.
Jamming Resistance (ECCM): The system "hops" frequencies thousands of times per second. Russian electronic warfare systems will have a hard time disrupting your communications.
Wide Bandwidth: We transmit not only voice, but 4K video from the tank's cameras to the headquarters in real time.

3. Satellite Communications (SATCOM)
At the back of the tower, in an armored "mushroom", we install a satellite terminal (e.g. Starlink in the military version or the Polish satellite system).
Advantage: Even if the enemy destroys all the radio masts in the area, your tank still has internet and contact with command via space.

4. Tank as a "Router" for Infantry
Thanks to its powerful hybrid power, the PL-H1 creates a local combat network around itself.
Infantry Support: Soldiers around the tank connect their tablets to your system. They see your 360-degree cameras on their tablets, giving them a huge advantage in urban combat.
Technical Communication Specifications:
Function System Benefit
BMS TOPAZ (WB Electronics) Full integration with Polish Army and NATO
Voice Communication Digital Intercom FONET Crystal clear sound despite the roar of battle
Data Link Link-16 / Link-22 Data exchange standard with F-35 and AWACS
Radio Range Up to 30 km (terrain), up to 300 km (SAT) Command over a huge distance

5. Stealth Radiowy (Emissions Control)
In Silent Watch mode (powered by batteries), the tank can turn off active transmissions, simply "listening" to its surroundings. This makes you undetectable to enemy radar reconnaissance systems.

Chapter 24

This is the most difficult element to obtain, because microprocessor production technology (below 7nm) is the domain of only three countries in the world (Taiwan, the USA, South Korea). Poland does not produce its own GPUs and will not produce them in the near future.

Here's a realistic plan to "arm" the brain of our PL-H1 with military-grade processors:

1. Where to get it (Sources and Partners)
We don't buy regular graphics cards from a store. We need GPGPU (General-Purpose Computing on Graphics Processing Units) systems that meet the MIL-STD-810 standard:

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Option A (Best): NVIDIA Xavier / Orin (Industrial/Militarized Edition). These units are designed for autonomous vehicles. They are small, consume little power (important for tank batteries), and have powerful AI (Tensor) cores.
Supplier: American company Curtiss-Wright or Mercury Systems. They take the chips from Nvidia and encase them in armored, sealed enclosures resistant to vibration from a 140mm shot and electromagnetic pulse (EMP).

2. Where to "produce" in Poland (Integration)
Although the chip will come from the US, the combat computer must be built in Poland so that no one has access to it via backdoors:
Factory: WB Electronics (Ożarów Mazowiecki). They are the brains behind the Polish defense industry. They buy "bare" processors and use them to build their own motherboards and write their own Argus-1 AI software.
The task: WB Electronics must create a liquid cooling system for these processors so they can operate in the enclosed, hot crew capsule.

3. What to replace it with (Plan B - Sovereignty)
If the US were to impose an embargo on the fastest deals:
FPGAs (e.g., Xilinx): These are processors that can be "reprogrammed" in hardware. They are slower than GPUs for graphics, but extremely fast for mathematical calculations (like predicting potholes). Poland has FPGA specialists (e.g., at AGH University of Science and Technology or Warsaw University of Technology) who could design a dedicated stabilization controller for them.

4. Specifications for the "Prediction" system:
Computing power: Min. 100-200 TOPS (Tera Operations Per Second).
Latency: Less than 5 ms (camera image must be analyzed before the wheel hits the pothole).

Chapter 25

In a classic tank, servicing is a nightmare—hydraulic oil leaks, valve adjustments in a gigantic diesel engine, and lubrication of hundreds of gears. In your PL-H1 Panthera, logistics are based on electromobility and modularity. Thanks to its hybrid drive, the tank itself tells the mechanic where it's hurting.

Here is the "PANTHER-CARE" logistics system in black and white:

1. System Autodiagnostyki (HUMS – Health and Usage Monitoring System)
This is a digital sensor system built into each section (A, B, C).
Vibration sensors: Monitor electric motor bearings and track rollers. AI detects micro-cracks in the metal 50 hours before failure.
Battery Monitoring System (BMS): Continuously measures the temperature and voltage of each cell in Section B. If one cell fails, the system isolates it and the tank continues to run.
Live Reporting: Technical data is sent via SATCOM directly to the field workshop. Mechanics know what to prepare before the tank leaves the front lines.

Top Secret

2. Drive Logistics (Plug & Play Modularity)
This is a revolution in servicing:
Powerpack-Slide: The entire generator (combustion engine + generator) in Section C is mounted on rails. Two cable disconnects and four screws – replacing the entire drive takes 45 minutes using a technical support vehicle.
No gearbox: We eliminate the most vulnerable and expensive component of the tank. Electric motors are virtually maintenance-free (they only require a coolant change once a year).
Fuel: Since our generator is a standard diesel (e.g. Scania/MTU), spare parts (filters, injectors) are available in every civilian logistics warehouse in Poland.

3. Ammunition and Energy Logistics
140mm Unification: Ammunition is heavy, so we use palletization. Entire cartridges are loaded into the turret from the rear using an automated feeder.
"External" Charging: The tank has a military-standard fast-charging socket. It can be charged from the base's power grid or from another mother vehicle, saving fuel in the generator.

4. Logistics Specification (Comparative Data)
Parameter PL-H1 Panthera (Hybrid) Classic Tank (Abrams/Leo)
Major inspection time 200 man-hours 600+ man-hours
Number of operating fluids: 3 (Engine oil, Coolant, Fuel) 6+ (Engine oil, Gearbox oil, Hydraulics, Brake fluid)
Fuel consumption (standstill) 0 l/h (Silent Watch on battery) 10-50 l/h (Engine must be running)
MTBF (Time Between Failures) 40% higher than the Abrams Standard

5. Virtual Service (VR Assistance)
A field mechanic puts on VR goggles and sees repair instructions overlaid on a real-world view of the tank. The Digital Twin system shows him exactly which cable to disconnect. This cuts repair time in half and allows less experienced soldiers to service the tank.

6. Parts from 3D Printers
Each PL-H1 battalion has a container-based 3D metal/polymer printer at its disposal. This allows for the "reprinting" of seals, brackets, and small armor components on-site, without waiting for delivery from factories in Gliwice or Stalowa Wola.

Top Secret

Chapter 26

Here is a detailed list of auxiliary weapons – what we must have and what we can add optionally:

1. Mandatory Equipment (Combat Standard)
We install these elements on every unit, because without them the tank is blind at close range:
ZSMU (Remotely Controlled Weapons Module) "Piorun": Mounted on the turret roof.
Armament: Polish 12.7 mm machine gun (WKM-B from Tarnów).

Function: Anti-aircraft defense (drones) and anti-infantry. It has its own thermal imaging head, so the commander can fire the machine gun while the gun operator aims the 140mm cannon at another tank (independent mode).
Coaxial Machine Gun (UKM-2000C): 7.62 mm, mounted next to the main gun. Used to "clear" the foreground directly where the 140 mm barrel is pointing.
Smoke Grenade Launchers (OBRA-3 System): 81 mm, integrated with laser sensors. Automatically deploys a smoke screen when someone aims at us.

2. Additional Options (Heavy Hunter Version)
We install this if the budget allows and we want to increase the range of fire:
Twin ATGM Launcher (Anti-Tank Missiles): Extends from the side turret recess.
Typ: Polski Piruet lub Spike-LR2.
Why is it worth it?: The 140mm gun has a range of approximately 4-5 km. The Spike missile hits targets 5.5-10 km away (even behind a hill, thanks to a camera in the missile's warhead). This allows it to destroy helicopters and tanks that are not yet visible in the crosshairs.
7.62mm Multi-Barrel Gatling Gun: Replaces the standard roof-mounted machine gun.
Advantage: Rate of fire up to 3000 rounds per minute. Perfect for "chopping" swarms of small FPV drones.
60mm Mortar (Internal): Mounted in the hull or turret, to fire illuminating flares or fragmentation grenades at very close range (e.g. when enemy infantry approaches the tank).

3. What is BETTER to install (My recommendation)
Instead of packing too many rockets, it is better to rely on Programmable Ammunition:
Instead of ATGMs, it's better to pay extra for a 140mm barrel missile programming system. This allows a single fragmentation round to explode directly over an enemy trench or just in front of a drone, acting like a powerful shotgun. It's cheaper and faster than a rocket.
List of Auxiliary Armaments (Table)
System Type Status Advantage
KM 12.7 mm (ZSMU) Heavy Rifle We Have Universal Defense Up/Down
KM 7.62 mm Coupling Rifle We Need Cheap Combat of Manpower
Spike / Piruet ATGM Launcher Option Range 10 km (beyond the horizon)
Gatling 7.62mm Anti-Drone Option Drone Swarm Massacre
Warmate Loitering Drones (in tube) Reconnaissance and Suicide Attack Option

4. What do we NOT need to install?
Heavy anti-aircraft launchers: This is what Poprad or Pilica systems are for. The tank is meant to fight on the ground. Overloading the turret with anti-aircraft missiles only increases its silhouette and makes it an easier target.

Top Secret

Chapter 27

1. Hull Production Technology (Step by Step)
Production takes place in a modular system, which is crucial for the speed of assembly and ease of repair of battle damage.
Cutting and Forming (HSW): High-power fiber lasers are used to cut 500-600 HBW steel sheets. Thick plates are bent on press brakes with a pressure of 2,000-3,000 tons.

Robotic Welding: The main hull "bathtub" is welded using automated welding portals. This ensures 100% weld consistency and eliminates thermal stresses that could weaken the armor.
Crew Capsule (Monokok): Made as a separate casting or welded structure from the hardest steel, lined internally with anti-spall composites (Spall Liner).
Drive Integration (Powerpack-Slide): Installation of rails in Section C, enabling the entire hybrid module (generator + electric motors) to be inserted in less than 1 hour.

2. Prototype Cost Estimate (R&D + Copy No. 1)
Building a prototype is the most expensive stage because it includes creating the tooling (molds, matrices, software).
Cost Item Estimated Cost (PLN) Notes
Design (CAD/BMS/AI) 350,000,000 Argus-1 system and hybrid drive integration.
Hull Construction (Materials and Labor) 120,000,000 Specialized steel, ceramics, frames.
Hybrid Drive (Components) 90,000,000 LG batteries, ABB motors, MTU/Hyundai generator.
Turret and Optical Systems (PCO/WB) 250,000,000 Unmanned turret, 140 mm gun (license).
Testing and Certification (Proving Grounds) 100,000,000 Fatigue, ballistic and traction tests.
TOTAL (Investment in Prototype) ~ 910,000,000 Cost of developing a national tank system.

3. Implementation time (Schedule from acceptance)
Assuming the project has been approved and funding is secured:
Month 1–12: Construction of prototype No. 1 (test specimen) and No. 2 (for destructive testing – firing).
Month 13–24: Intensive field testing (qualification tests). Hybrid testing in extreme mud and cold.
Month 25–36: Construction of a trial batch (pre-production series – 5–10 units). Training of the first crews and mechanics.
Month 37+: Start of Mass Production.
In total: From prototype development to full production, we need approximately 3-4 years. This record-breaking pace is only possible thanks to the use of off-the-shelf technologies (Borsuk/K2).

4. Batch Production Efficiency (PL Capabilities)
Ultimately, Polish plants (HSW and Bumar) could operate in the following rhythm:
Parameter Value Purpose
Number of pieces / year 40 – 60 pieces Full re-equipment of the battalion per year.
Serial cost (1 pc.) PLN 65 – 80 million Competitive price compared to Abrams/Leopard.
Share of Polish parts ~75% Maximum technological sovereignty.
Why is it worth it?
By spending PLN 1 billion on a prototype, we are creating the Polish Tank of the Future. The money isn't flowing abroad, but rather building engineering capacity at home. Each subsequent production tank will be approximately 30% cheaper to maintain than a traditional vehicle with an internal combustion engine and gearbox.
Do you want me to write out a list of specific Polish companies that will be part of the production consortium (who will be responsible for the armor, who for the cables, who for the screws), or should we move on to the field test plan?

Top Secret

Chapter 28

Here's how we can obtain, manufacture or replace missing drive blocks:

1. SiC Inverters and Converters (The Brain of the Drive)
They convert the electricity from the battery into a powerful torque of 1,500 HP.
Where to get it: The safest route is the US (Curtis Instruments / BorgWarner) or Korea (Hyundai Mobis). They have high-voltage (800V) modules ready for military use.
How to manufacture in Poland: We'd need to partner with Polish companies like APS Energia (Sulejówek) or TME. They make powerful power supplies for railways. They need a license for silicon carbide (SiC) components to miniaturize their control cabinets to the size of a toolbox.
What to replace it with: A “low-tech” version – using two separate inverters from Solaris electric buses, but they will take up twice as much space and require more powerful cooling.

2. Final Drives and Final Drives (Power Transmission)
They must withstand a torque impact that would break regular sprockets.
Where to get it: The leaders are the German Renk and the Italian Iveco Defence. These are the absolute top of the line in tank transmissions.
How to manufacture in Poland: Huta Stalowa Wola or Stal-Systems offer a chance here. We have the machinery for Krab gears. However, we need to purchase a license for ultra-hard steel alloys and precision tooth grinding for electric drive (which operates differently than a combustion engine).
What to replace: In-Wheel engines (engine inside the drive wheel), which eliminates gears but exposes the engines to mine damage. This is a risky solution; it's better to stick with armored side gears.

3. Liquid Cooling System (Thermal)
Without this, LG batteries from Wrocław will "swell" after 10 minutes of hard driving.
Where to get it: French company Sofriser or American company Parker Hannifin. They manufacture armored pumps and dielectric fluid coolers.
How to manufacture in Poland: Jelcz or Autosan plants have heat exchanger departments. We need to commission them to build a system based on synthetic oil (safer than glycol) that simultaneously cools the batteries and electric motors.
What to replace: Air cooling (fans), but it "glows" like a Christmas tree in thermal imaging and is inefficient in summer. I don't recommend it.

4. 800V Power Busbars and Connectors
Where to get it: Swiss Stäubli or German Rosenberger. They make connectors that won't spark even under heavy vibration.
How to produce in Poland: This is the simplest element. Any Polish copper plant (e.g., KGHM Group) can cut the rails from oxygen-free copper. Insulation (epoxy resin or Teflon) can be applied by chemical plants (e.g., Grupa Azoty).
Table: Chassis Action Plan
Component Acquisition route Polish factory (Manufacturer)
800V Inverters US/Korea License APS Energia / Medcom
Side gears Licensed by Renk (Germany) HSW / Stal-Systems

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Cooling pumps Purchase of ready-made Jelcz / Mesko (assembly)
Copper rails 100% Poland KGHM / Kable (Kraków)
To sum up: We have to use the "brain" controlling the current from abroad (USA/Korea), but we can produce the mechanics (gears) and installation (rails/cooling) at home by only purchasing the "recipe" (license).

Chapter 29

Here is the real division of production in Polish factories and support from allies:

1. Hull and Structure (100% Polish)
Huta Stalowa Wola (HSW): Lead integrator. This is where the "armored citadel" (Section A) is being built and the hull is being welded. We utilize armor steel and technologies from the Krab/Borsuk chassis.
Bumar-Łabędy (Gliwice): Final assembly line and service. We leverage their experience in modernizing Leopard tanks.
Mascot (Grudziądz): Production of ceramic and composite inserts for layered armor.

2. Hybrid Drive (Polish Thought + Heart from Neighbors)
Here we make a clever "folding":
Generator (Combustion Engine): We buy a pre-built engine from MTU (Germany) or STX/Hyundai (Korea). We don't build it from scratch, as that takes 10 years.
Electric Motors and Inverters: Cantoni Group (Żychlin) or ABB (Poland). Polish plants can manufacture powerful 600 kW electric motors to power the tracks.
Batteries: LG Energy Solution (Wrocław). We have the largest battery factory in Europe right on our doorstep. We're using their cells to build a rugged power bank in Section B.

3. Turret and Armament (Polish Thought + License)
Unmanned Design: HSW and WB Electronics. We already have the ZSSW-30 turret, we're scaling it to a 140mm monster.
140 mm gun: We purchase a license from Rheinmetall (Germany) or KNDS (France). The barrel is forged at HSW (they have some of the most modern presses and furnaces in Europe).
Optics and Thermal Imaging: PCO SA (Warsaw). These are our "family silverware." They make scopes as good as the Americans.

4. Electronics and Communications (100% Polish)
"Mózg" (Brain) System (SKO/BMS): WB Electronics (Ożarów Mazowiecki). Their TOPAZ system is already halfway across NATO. They will combine the hybrid drive with the sight and drones.
Radio stations: Radmor (Gdynia).
Table: Real Division of Labor
Project Element Factory / Partner Where do we get the technology from?
Armor and Hull HSW / Bumar Polska (Steel/Ceramics)
Engine (Generator) MTU (Germany) / Hyundai (Korea) Import / License

Top secret

Cantoni Electric Drive / ABB (Poland) Poland (Local production)
LG Li-Ion Batteries (Wrocław) Production in Poland
140 mm HSW Gun (Production) License KNDS/Rheinmetall
Electronics/AI WB Electronics / PCO 100% Poland
Finance: Why is it worth it?
Building a tank from scratch (a "clean sheet of paper") would cost approximately PLN 15-20 billion for research alone.
Thanks to cooperation:
We take a ready-made engine (cheaper).
We take the gun license (faster).
We put in our own electronics and armor (the biggest margin stays with us).
Unit cost: Estimated $15-18 million per unit (comparable to the Abrams SEPv3, but with technology 15 years newer).

Chapter 30

We replace technologies with engineering cunning.

PL-H1 "Wilk" Prototype Metrics
Weight: 55 tons (optimal for Polish bridges and swampy terrain).
Drive: Series hybrid (1500 HP electric motor + 1000 HP diesel generator).
Crew: 3 people in an armored capsule in the hull (safety modeled on the AbramsX).
Turret: Unmanned, low-profile (difficult target for the enemy).

1. What we already have (Polish production base):
tank construction and Polish realities

These are the components ready for assembly in the HSW and Bumar halls:
"Mózg" System (WB Electronics): Argus-1 digital fire control system integrated with the TOPAZ system. Manages combat, drones, and hybrid propulsion.
Eyes (PCO SA): Third-generation thermal imaging cameras and the OBRA-3 laser warning system. We see the enemy at night better than they see us.
Energy (LG Energy Wrocław): Armored Li-Ion battery bank (120 kWh) mounted in the bottom of the hull.
Muscles (Cantoni/Komel): Two electric traction motors (2x 600 kW). They provide full power immediately after starting.
Armor (PGZ/Mascot): ERAWA-1/2 reactive cubes and Polish ballistic ceramics (SiC).
Construction (HSW): Welded hull "bathtub" and wishbones (technology from Borsuk/Krab).
Communications (Radmor): SDR software-defined radios, resistant to jamming.

2. What are we MISSING (and how do we solve it in Polish):
Component What's missing? A solution "for Poland's budget"
140mm precision barrels licensed by ASCALON (France) manufactured at HSW. We add Polish carbon fiber laminate to the barrel for lighter weight and more accurate performance.
Steel 600 HBW Blast Furnaces Import from Sweden (SSAB) for the first 10 pieces, in the meantime construction of a hardening plant in Stalowa Wola.

Top Secret

Polish Diesel Generator Adaptation of a Scania/MTU engine (popular, cheap parts) coupled to a Polish generator.
AI Processors of Polish Silicon Importing Nvidia chips and enclosing them in Polish, armored oil-cooled "cans".
800V Miniaturization Inverters Medcom/APS Energia Collaboration – scaling their technology from trams to tank size.
Hard-Kill APS Missile Destroyer "Piorun-Lite" System – an adaptation of Polish Piorun missiles to destroy incoming drones and missiles.

3. Section Arrangement (Internal Structure):
Section A (Front): A three-person pod. The crew sits shoulder to shoulder. The lack of a turret overhead increases their chances of survival by 80%.
Section B (Center): Automatic loader (22 rounds in turret + 12 in hull) and battery bank under the floor.
Section C (Rear): Hybrid Powerpack (Generator + Electric Motors). Can be replaced in 45 minutes using the "take-out-put-in" method.

4. Why is this a REAL PROJECT?
We're not building a spaceship. We're building a tank with Polish electronics (which are world-class) and foreign heavy mechanics (which we simply purchase under license).
Serial cost: approx. PLN 65-75 million.
Time to prototype: 24 months from start of financing.
This is a tank that can be built in the Republic of Poland, provide work for thousands of people and make the Polish armored "Wolves" a source of fear for any aggressor.

Chapter 31

The modern battlefield (Ukraine, Middle East) has brutally challenged tank designs from the last century. Our PL-H1 "Wilk" isn't a response to the clashes of the 1990s, but to the threats that dominate today: FPV drones, loitering munitions, and precision anti-tank systems.

Here's how the Polish project fits into the realities of the 21st century:

1. Crew Survivability: "Life Capsule"
In Russian tanks, the turret is blown up along with the crew upon impact. In Western tanks (Abrams, Leopard), the crew sits next to the ammunition or under the huge, heavy turret.
In combat: Our "Wilk" has its crew in an isolated pod within the hull. Even if the turret is destroyed by a drone or Javelin missile, the crew has a 90% chance of survival and withdrawal from combat. In Poland, where a trained soldier is more valuable than steel, this is a priority [1].

2. Drone War: The "Electronic Bubble"
Today's tank without anti-drone protection is just a "coffin on tracks".

Top Secret

In combat: Thanks to its hybrid drive and massive power supply, the "Wilk" has an integrated EW (Electronic Warfare) system. It creates an invisible barrier around itself that "cuts off" the control signal of incoming FPV drones before they hit the roof [10, 14].

3. Mobility and Silence: "Stealth Mode"
Traditional tanks can be heard from several kilometers away, allowing the enemy to prepare an ambush.
In combat: The electric drive allows for silent approach to a firing position (Silent Move). The tank emits neither engine noise nor a huge cloud of heat (exhaust gases), making it almost invisible to enemy thermal imaging at night [11]. Electric acceleration (1500 HP instantaneous) allows for rapid escape from the line of fire after firing [1, 10].

4. Firepower: 140mm Gun vs Modern Armor
Modern explosive reactive armor (ERA) is becoming increasingly resistant to the standard 120 mm caliber.
In combat: The 140 mm ASCALON gun is the "ultimate argument." It allows you to destroy the heaviest enemy units from a safe distance (4-5 km), before they enter effective fire range. It's a "see first, shoot first, destroy in one shot" approach [1, 9].

5. Logistics: Less Fuel, More Fight
The war in Ukraine has shown that fuel tankers are the most common target of attacks.
In combat: Our hybrid system burns 30-50% less fuel than the Abrams turbine. The tank can remain on "Silent Watch" for several hours, observing the terrain with thermal imaging, without consuming a single drop of fuel – it runs solely on LG batteries from Wrocław [11].
Technical summary for the 21st century battlefield:
Threat Solution in PL-H1 "Wilk" Technology Status
FPV Drones Polish Jammer WRE + ZSMU 12.7 mm MAMY (WB / Tarnów)
Top-Attack Missiles Hull Capsule + MAMY Roof Armor (HSW / ERAWA)
Enemy Thermal Imaging Electric Drive (low thermal footprint) WE HAVE (Cantoni / LG)
No bridges Weight 55 tons (instead of 70 tons) POLISH PROJECT
The PL-H1 "Wilk" is a tank that is not afraid of the modern battlefield, because it was designed with its most dangerous aspects in mind, and not as a modernization of an old design.

Top Secret